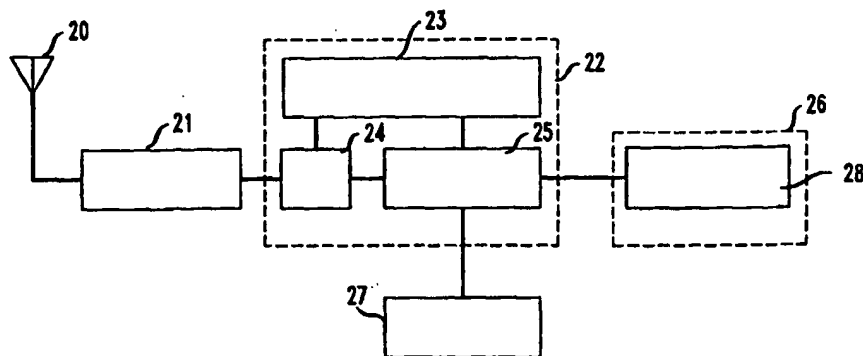




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<p>(21) International Application Number: PCT/US97/16149</p> <p>(22) International Filing Date: 16 October 1997 (16.10.97)</p> <p>(71) Applicant: AT & T WIRELESS SERVICES, INC. [US/US]; 5000 Carillon Point, Kirkland, WA 98033 (US).</p> <p>(72) Inventors: LAWRENCE, Christopher, Gregory; 9333 N.E. 132nd Place, Kirkland, WA 98034 (US). RAFFEL, Michael, Allen; 13831 173 Avenue, N.E., Redmond, WA 98052 (US).</p> <p>(74) Agent: WEINICK, Jeffrey, M.; c/o S.H. Dworetsky, AT & T Corp, 200 Laurel Avenue, Middletown, NJ 07748 (US).</p>	<p>(81) Designated States: CA, JP, MX, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Published <i>With international search report.</i></p>	

(54) Title: DYNAMICALLY SELECTING A WIRELESS NETWORK OFFERING A DESIRED SERVICE FEATURE



(57) Abstract

A method and apparatus is provided for communicating on a wireless network which offers a selected service. In accordance with the method, a wireless communicator is tuned to a first signaling control channel broadcast by a wireless network. The first channel identifies one or more services provided over that network. This procedure is repeated for successive signaling control channels until a wireless network providing the selected service is identified. Once this has been identified, communication is conducted between the wireless communicator and the network.

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DYNAMICALLY SELECTING A WIRELESS NETWORK OFFERING A DESIRED SERVICE FEATURE**Technical Field of the Invention**

This invention relates to communications systems, and more specifically, to a wireless end-user device that is dynamically reconfigurable.

Background of the Invention

A wireless telephone communication system typically provides services to a geographic area by dividing the area into many smaller individual radio coverage areas, known as cells in a cellular system, each of which is serviced by a transmitter-receiver station, known as a cell site. The cell sites are connected through landlines or other communication links, to so-called mobile telephone switching offices (MTSO's) which are, in turn, connected to the public switched telephone network (PSTN). Any given area is typically serviced by up to two competing wireless carriers each providing a wireless system.

As more users rely on wireless systems for delivery of communications services, many of those users are increasingly demanding from their wireless carriers at least the same sophisticated communications service features that are available from their wireline networks. In response to this need of the marketplace, some wireless carriers have enhanced their switching systems to provide features, such as call waiting, call forwarding and three-way calling, to name a few. In addition, interconnection of wireless networks allows wireless subscribers to access their pre-subscribed communications services features even when they are roaming in another wireless communications carrier's service area. In spite of these developments, a wireless user is still unable to dynamically select a communications service feature that is not pre-subscribed by the user. The unavailability of non-pre-subscribed service features stems from a variety of factors, not the least of which is the inability of a wireless communicator to dynamically select on a call-by-call basis a wireless communications carrier or network that offers the desired service feature.

In an attempt to address this problem, some wireless communicator manufacturers have included in their telephone sets multiple Number Assignment Modules (NAMs) to support

- 2 -

subscriptions to services from multiple carriers. A NAM is a memory location within the wireless communicator in which an installer technician stores an assigned telephone number and a System Identification Number (SID) which uniquely identifies a particular wireless network which is primarily intended to provide airtime service for that communicator. A conventional wireless communicator determines whether at any given time it is located within its home local service area by scanning certain frequencies to receive SIDs broadcast by wireless networks and then comparing the received SIDs to SIDs stored in the NAM.

While the provision of a NAM allows the communicator to identify the primary network to which it is pre-subscribed, it does not allow the communicator to select a network based on the availability of a desired service feature. Rather, the wireless user must possess a priori knowledge of which service feature is provided by which network. Hence, it is a continuing problem for wireless users to transparently access service features from different wireless carriers without pre-subscription to each one of those wireless carriers.

Summary of the Invention

The present invention provides a method and apparatus for communicating on a wireless network providing a selected service. In accordance with the method, a wireless communicator is tuned to a first signaling control channel broadcast by a wireless network. The first channel identifies one or more services provided over that network. This procedure is repeated for successive signaling control channels until a wireless network providing the selected service is identified. Once this has been identified, communication is conducted between the wireless communicator and the network.

In an alternative embodiment of the invention, the first channel is broadcast in a radio coverage area such as a cell and identifies one or more services provided by a wireless network in the radio coverage area. The wireless communicator tunes to the first channel and then to successive channels which identify one or more services provided by successive wireless networks in the radio coverage area. This procedure is continued until a given channel is located that

- 3 -

identifies the selected service. Communication then commences between the wireless communicator and the wireless network broadcasting the given channel.

Brief Description of the Drawing

The sole Figure shows a simplified block diagram of wireless communicator constructed in accordance with the present invention.

Detailed Description

The present invention is directed to a wireless communicator that is designed to dynamically identify and select from a group of wireless networks (or, alternatively, a group of subnetworks or cells) a particular network (or subnetwork or cell) which offers or supports a communications service feature requested by a user. The user may select the service feature for a short time such as for the duration of a call or for any longer duration. After the particular wireless network is chosen by the wireless communicator, the wireless communicator automatically initiates (i.e., without the user's intervention) communication with the wireless network that provided the requested service for the delivery of the communications service feature. According to one aspect of the invention, the communications service feature requested by the user may be, for example, a cellular communications service, a Personal Communications Service (PCS), a paging or Short Message Service (SMS), or a Specialized Mobile Radio (SMR) service. The respective services may be provided by a service provider operating over the network via a service provider gateway associated therewith. Alternatively, the services may be provided by the wireless carrier itself.

In an alternative embodiment of the invention, the wireless communicator dynamically identifies and selects a radio coverage area which offers the requested service feature or features. Individual radio coverage areas, which may be cells in a cellular network, for example, are typically provided with wireless communications via two or more distinct wireless networks. The radio coverage area that is selected may be one other than the local area in which the wireless communicator is currently operating. In other words, the communicator may initiate service with a

- 4 -

network that does not ordinarily provide local radio coverage if there is no available network normally operating in the local radio coverage area that offers the desired service feature.

FIG. 1 shows a block diagram of a wireless communicator in accordance with the present invention. The wireless communicator includes a transceiver 21, antenna 20, controller 22, a user input 26 such as a keypad, and a speaker and microphone 27. The controller 22 processes incoming and outgoing signals and includes a microprocessor 25, a digital signal processor 24 and a memory 23. The user input 26 includes a service request selector 28 which allows the user to specify to the controller 22 the service or services that are desired. The controller 22 in turn directs the transceiver 21 to monitor signaling control channels (discussed in more detail below) broadcast by various wireless networks so that communication can be established with a network that is identified as offering the desired service or services.

In one embodiment of the invention, a wireless communicator tunes to a first signaling control channel over which a wireless network broadcasts carrier-specific information such as a System Identification (SID) number and a service menu. The service menu lists the various service features available over that network, such as call waiting, dial forwarding, facsimile transmission, and three-way calling, for example. The wireless communicator browses the service menu to assess the availability of the communications service feature requested by the user via the service request selector 28. If the wireless network offers the communications service feature requested by the user, the communicator initiates a service request to the wireless network. If necessary, the wireless communicator registers onto the wireless network supporting the requested service. Alternatively, if the wireless communicator is already registered onto the appropriate network, the wireless communicator simply conducts communication with the network so that the desired service feature is provided to the user.

If the first wireless network to which the communicator tunes does not offer the communications service feature requested by the user, the communicator tunes to a second control channel to browse through the menu of the wireless network associated with the second control channel. The control channel tuning and menu-browsing process continues until the wireless communicator identifies a wireless or wired network that offers the communications service feature

- 5 -

requested by the user or until the list of networks is exhausted. Thereafter, a service request is initiated to the identified network for delivery of the communications service feature desired by the user. As previously mentioned, the identified network may or may not be operational in the current local radio coverage area of the communicator. The user may also configure the device through an appropriate input to select from among a plurality of networks that each have the requisite service feature on an additional basis such as cost and speed, for example.

One of ordinary skill in the art will recognize that the signaling control channel defined by the present invention may be readily incorporated into any of the established digital cellular interface standards, including, but not limited to, EIA/TIA Standard 553, "Mobile Station-Land Station Compatibility Specification," September 1989, Electronic Industries Association, Washington, D.C.; EIA/TIA Interim standard IS-54-B, "Cellular System Dual-Mode Mobile Station - Basestation Compatibility Standard," April, 1992, Electronic Industries Association, Washington, D.C.; and EIA/TIA Interim Standard IS-136, "Cellular System Dual-Mode Mobile Station - Basestation: Digital Control Channel Compatibility Standard," April, 1995, Electronic Industries Association, Washington, D.C. Moreover, the IS-136 standard incorporates a digital control channel that may broadcast the SID number and a service menu.

In one embodiment of the invention, the service request selector 28 is configured so that the user can select one of three different operational states. In the first operational state, upon activation of the wireless communicator, the communicator automatically begins monitoring various signaling control channels and registers onto a wireless network that offers a preselected service or services. In a second operational state, the communicator only begins monitoring signaling control channels when the user manually selects a desired service or service. Finally, in a third operational state, the communicator begins monitoring various signaling control channels to conduct communication with a network that offers a service that the communicator itself identifies as being required. For example, if the user connects facsimile equipment through an appropriate input port of the communicator, the communicator when operating in this state, will automatically attempt to identify and communicate with a wireless network offering facsimile service. In some embodiments of the invention the service request selector 28 may offer all three of these operational states or,

- 6 -

alternatively, any one or two of these operational states. The communicator also may be provided with status indicators such as LEDs, for example, that indicate the current operational state of the mode selector. Status indicators may also be provided to identify the selected service or services requested by the user.

Claims:

1. A method for communicating on a wireless network providing a selected service, said method comprising the steps of:
 - (a) tuning, with a wireless communicator, to a first signaling control channel broadcast by a wireless network, said first channel identifying at least one service provided over the wireless network;
 - (b) repeating step (a) for successive signaling control channels until a wireless network providing the selected service is identified;
 - (c) conducting communication with said wireless network providing the selected service.
2. The method of claim 1 wherein said at least one service is a personal communications service.
3. The method of claim 1 wherein said at least one service is a paging service.
4. The method of claim 1 wherein said at least one service is a short message service.
5. The method of claim 1 wherein said first channel includes a service menu and a system identification number.
6. The method of claim 5 wherein said service menu comprises a service selected from the group consisting of call waiting, dial forwarding, facsimile transmission, and three-way calling.
7. The method of claim 1 wherein step (c) includes the step of registering onto said wireless network.

- 8 -

8. The method of claim 1 wherein said first signaling control channel is included in a digital cellular interface standard.

9. A method for communicating on a wireless network providing a selected service, said method comprising the steps of:

(a) tuning, with a wireless communicator, to a first signaling control channel broadcast in a radio coverage area, said first channel identifying at least one service provided by a wireless network in said radio coverage area;

(b) repeating step (a) for successive signaling control channels until a given channel is located that identifies said selected service;

(c) conducting communication with a wireless network broadcasting said given channel;

10. The method of claim 9 wherein at least said first signaling control channel and one of said successive signaling control channels are broadcast in different radio coverage areas.

11. The method of claim 9 wherein said at least one service is a paging service.

12. The method of claim 9 wherein said at least one service is a short message service.

13. The method of claim 9 wherein said first channel includes a service menu and a system identification number.

14. The method of claim 13 wherein said service menu comprises a service selected from the group consisting of call waiting, dial forwarding, facsimile transmission, and three-way calling.

- 9 -

15. The method of claim 9 wherein step (c) includes the step of registering onto said wireless network.
16. The method of claim 9 wherein said first signaling control channel is included in a digital cellular interface standard.
17. A wireless communicator, comprising:
a transceiver;
an antenna coupled to said transceiver;
a microphone and speaker for providing an audio interface;
a user input for receiving user-initiated requests, said user input including a service request selector for selecting a service from among of plurality of services, said transceiver, responsive to said service request selector, being adapted to monitor control signals broadcast from a plurality of wireless networks, said control signals identifying services provided over respective ones of said wireless networks, said transceiver being further adapted to initiate communication with a wireless network broadcasting a control channel that identifies the selected service;
a controller for controlling said transceiver.
18. The communicator of claim 17 wherein said service request selector provides a plurality of user-selectable operational states, a first of said operational states
19. The communicator of claim 18 wherein in a first of said operational states the communicator automatically performs steps (a)-(c) upon activation for a preselected service.
20. The communicator of claim 19 wherein in a second of said operational states the communicator performs steps (a) - (c) subsequent to activation and upon manual selection of the user.

- 10 -

21. The communicator of claim 20 wherein in a third of said operational states the communicator automatically performs step (a) -(c) to conduct communication with a network offering a service identified by the communicator as being required.

22. The method of claim 17 wherein said at least one service is a personal communications service.

23. The method of claim 17 wherein said selected service is a paging service.

24. The method of claim 17 wherein said selected service is a short message service.

25. The method of claim 17 wherein said control signals include a service menu and a system identification number.

26. The method of claim 25 wherein said service menu comprises a service selected from the group consisting of call waiting, dial forwarding, facsimile transmission, and three-way calling.

27. A wireless communicator, comprising:
a transceiver;
an antenna coupled to said transceiver;
a microphone and speaker for providing an audio interface;
a user input for receiving user-initiated requests, said user input including a service request selector for selecting a service from among of plurality of services, said transceiver, responsive to said service request selector, being adapted to monitor control signals broadcast within at least one radio coverage area, each of said control signals identifying services provided by a wireless network in the radio coverage area, said transceiver being further adapted to

automatically initiate communication with a wireless network broadcasting a control channel that identifies the selected service;

a controller for controlling said transceiver.

28. The wireless communicator of claim 27 wherein said transceiver is adapted to monitor signals broadcast within a plurality of radio coverage areas.

29. The communicator of claim 27 wherein said service is a personal communications service.

30. The communicator of claim 27 wherein said service is a paging service.

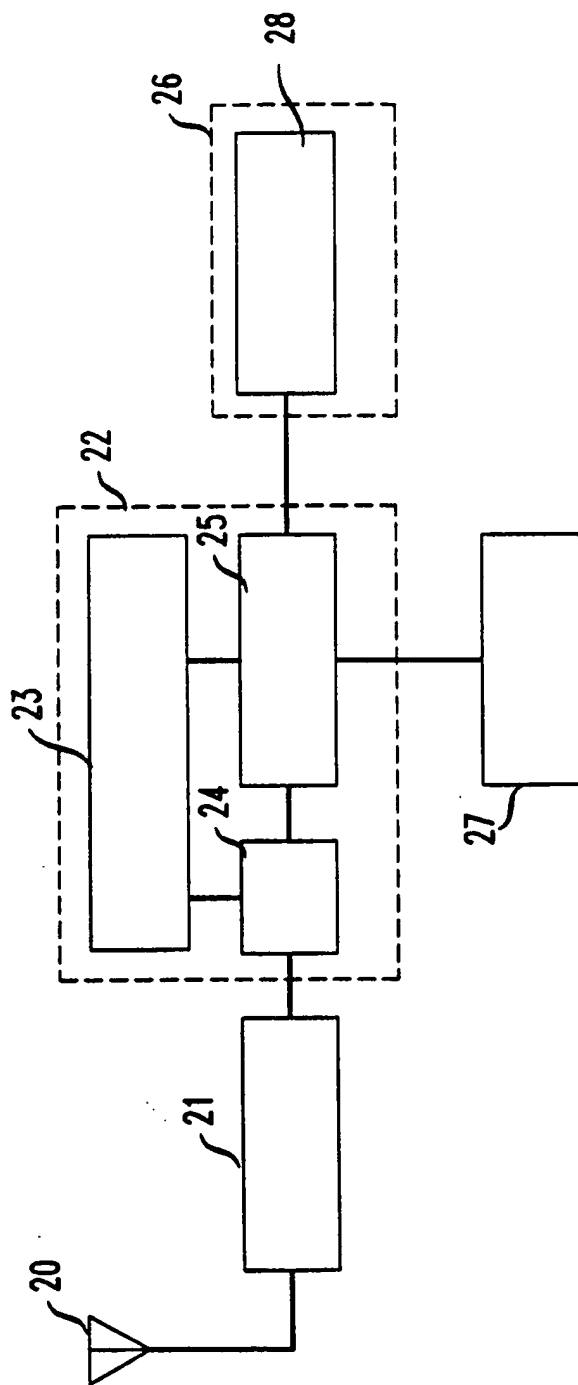
31. The communicator of claim 27 wherein said service is a short message service.

32. The communicator of claim 27 wherein said control signals include a service menu and a system identification number.

33. The communicator of claim 32 wherein said service menu comprises a service selected from the group consisting of call waiting, dial forwarding, facsimile transmission, and three-way calling.

1/1

FIG. 1



INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/16149

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 H04Q7/38 H04Q7/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 6 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 781 064 A (NOKIA MOBILE PHONES LTD) 25 June 1997 see column 6, line 58 - column 15, line 33 see claims 6,8 ---	1-9, 11-17, 22-27, 29-33
X	WO 96 28947 A (NOKIA MOBILE PHONES LTD ;VAZVAN BEHRUZ (FI); JORMALAINEN JANNE (US) 19 September 1996 see page 5, line 10 - line 18 see page 9, line 36 - page 13, line 2 ---	1-4,7-9, 11,12, 15-17, 22-24, 27,29-31
A	US 5 613 213 A (GRUBE GARY W ET AL) 18 March 1997 see column 1, line 62 - column 5, line 15 ---	1,9,17, 27
-/--		

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
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Date of the actual completion of the international search

19 August 1998

Date of mailing of the international search report

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Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/16149

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 90 13211 A (MOTOROLA INC) 1 November 1990</p> <p>-----</p>	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 97/16149

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 18-21
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

A number of lines of claim 18 have been left out, making this claim obscure.
For this reason claim 18 and the claims dependent thereon could not be searched.
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/16149

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0781064 A	25-06-1997	NONE	
WO 9628947 A	19-09-1996	FI 951181 A AU 4881196 A EP 0815701 A	14-09-1996 02-10-1996 07-01-1998
US 5613213 A	18-03-1997	NONE	
WO 9013211 A	01-11-1990	AU 637606 B AU 5343490 A CA 2045467 C CN 1048638 A,B DE 69029133 D DE 69029133 T EP 0474641 A IL 93444 A JP 4504934 T KR 9508646 B US 5301359 A	03-06-1993 16-11-1990 31-01-1995 16-01-1991 19-12-1996 15-05-1997 18-03-1992 30-05-1994 27-08-1992 03-08-1995 05-04-1994